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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/763,633

01/22/2004

Susan G. Yan

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EXAMINER

WALKER, KEITH D

ART UNIT

PAPER NUMBER

1745

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/763,633	Applicant(s) YAN ET AL.	
	Examiner Keith Walker	Art Unit 1745	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 April 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5-8,10-14 and 21-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-8,10-14 and 21-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 April 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

Claims 1, 2, 5-8, 10-14, 21-29 are pending examination as discussed below.

### ***Drawings***

The drawings received on 4/23/07 are acceptable for examination purposes.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 8 and 21-29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation "an ionomer having a concentration that is about half of the ionomer concentration of the catalyst in a final cathode or anode of the MEA" is not supported by the original specification. As disclosed in paragraph [0027] of the original specification, the catalyst ink comprises about half the ionomer concentration, as a ratio of carbon, of the final catalyst layer including the ionomer layer.

Claims depending from claims rejected under 35 USC 112, first paragraph are also rejected for the same.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 2, 5-8, 10, 11, 13, 14 & 21-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Publication 2002/0034675 (Starz).

Starz discloses a method of making a membrane electrode assembly (MEA) consisting of spraying catalyst ink on both opposite surfaces of a proton conducting membrane in the protonated form. The catalyst ink comprises a catalyst, a solvent and half the concentration of ionomer in the final catalyst ([0031, 0032, 0054]). The MEA is then soaked in sulfuric acid and then in water.

Starz is silent to clamping the membrane.

It would be obvious to one of ordinary skill in the art to use a clamp to hold the membrane in the process of making an MEA. Furthermore, applicant admits on page 8 of the arguments that "One of ordinary skill in the art would readily recognize what type of clamp would be needed for this purpose..."

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify Starz's method of making a membrane with a

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clamp well known in the art for the purposes of securing the membrane and preventing the membrane from wrinkling, which are also well known by one of ordinary skill in the art.

Starz is silent to first spraying on the ionomer and then spraying on the catalyst ink. Starz teaches mixing the ionomer and the catalyst together and spraying the combination in one step as opposed to two separate steps. It would have been obvious to one skilled in the art to separate the single spraying step of one combination component into two separate spraying steps comprising the two components of the combination, since it is held that separating known integral components into various elements involves only routine skill in the art (MPEP 2144.04).

Starz is silent to using a heat lamp for drying the membrane. Starz teaches using a circulating air oven for drying the membrane. Since no criticality has been given to the use of the heat lamp for the drying of the membrane and in the absence of unexpected results, the use of the oven to dry the membrane is seen as an equivalent drying process as the claimed heat lamp.

Starz is silent to spraying multiple layers to acquire a desired thickness. It would have been obvious to one skilled in the art to spray multiple layers of any substance, such as a catalyst layer, to achieve a desired thickness of the sprayed layer.

2. Claims 2, 6, 12-14, 22-24 & 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Publication 2002/0034675 (Starz) in view of US Patent 6,277,513 (Swathirajan).

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The teachings of Starz as discussed above are incorporated herein.

Starz is silent to first spraying on the ionomer and then spraying on the catalyst ink, spraying multiple layers, using a heat lamp and hot pressing the MEA.

Swathirajan teaches making an MEA with layered electrodes consisting of a first layer having an ionomer layer without a catalyst and then a second layer comprising the catalyst is applied on top of the first layer (Abstract, 7:1-15). A heat lamp is used to dry the catalyst layer (9:5-15). It would be obvious to one skilled in the art at the time of the invention to combine the spraying and drying step to quicken the process of making a membrane. After the membrane is coated on both sides, the assembly is hot pressed forming the final MEA with both electrodes (7:35-50). This process of making a layered electrode improves catalyst utilization in the fuel cell and improves reactant gas diffusion (1:40-46, 2:40-45).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the fuel cell of Starz with the layered electrode of Swathirajan to increase the catalyst utilization, which reduces the amount needed and therefore reduces the manufacturing cost of the electrodes.

3. Claims 5, 12, 13, 23 & 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Publication 2002/0034675 (Starz) in view of US Patent 5,330,860 (Grot).

The teachings of Starz as discussed above are incorporated herein.

Starz is silent to using a heat lamp and hot pressing the MEA.

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Grot teaches using a heat lamp and pressure to fix the catalyst ink onto the membrane (8:15-50). It would be obvious to one skilled in the art at the time of the invention to combine the spraying and drying step to quicken the process of making a membrane. The heat and pressure securely bind the catalyst ink to the membrane to prevent delaminating of the electrode. The efficiently produced MEA does not crack or deform during operation and does not decrease the ionic conductivity of the structure, thereby improving the fuel cell performance (3:45-60, 4:15-25).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the MEA making process of Starz with the heating and pressure teachings of Grot to form a better MEA that will improve the fuel cell operation through reliability.

### ***Response to Arguments***

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Walker whose telephone number is 571-272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

K. Walker

MARK RUTHKOSKY  
PRIMARY EXAMINER  
*Mark Ruthkosky* 7-5-07